the Segama, he was forced to return to the mouth of the Kinabatangan and go down the coast to the Segama, where his mission was to search for gold. The accident which brought his life to an end took place a considerable distance up this river, while he was still ascending it. This, in the barest outline, represents Mr. Hatton's geographical work in Borneo; his mineralogical work was carried on simultaneously. The difficulties of all kinds which he succeeded in overcoming—and they were neither few nor small—are recorded in his diaries and letters. These represent an amount of work rarely done by young men who have barely reached their majority; and this was only the earnest of what he would have accomplished had his life been spared. It is interesting to notice that, according to the latest official reports from North Borneo, gold had been found in small quantities on the Segama River at several places after Hatton's death. The peculiarly painful circumstances under which he died have led to the publication of much of a personal, and perhaps somewhat temporary, interest, but his journals and reports contain solid matter enough on this new British possession to render the volume worth publishing on wider and more general grounds.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

On "Seter," "Strandlinjer," or Parallel Roads in Central Norway

I SEND you a copy of a paper from the *Archiv for Mathematik og Naturvidenskab*, Band 10, "Om seter eller strandlinjer i store hoider over havet." As I here describe, as existing in a great part of Central Norway, a phenomenon quite analogous to the famous parallel roads of Lochaber, and also make an attempt towards the solution of the much-discussed question of the origin of these shelves, an abstract will perhaps be of some interest to your readers.

The Norwegian roads I have seen are all situated on the southern side of what geography-books call the Dovrefjeld. In a great many, if not all, of the valleys originating here, especially in Glomdalen, which the railroad from Christiania to Trondhjem follows, and in Foldalen and Rendalen, one to three horizontal shelves are to be seen on both sides, with all the peculiarities described by MacCulloch, &c., from Lochaber. Perhaps, however, the shelves do not slope so much against the valley, and the detritus in it is more worn than in the common till. But there is another more significant difference. Not only at a single point, as noted from Glen Spean, but for several kilometres—*e.g.* in Rendalen—the rock appears as a vertical wall on the inner side, giving the road an aspect exactly like the well-known *strandlinjer* from our coasts. Such rock-shelves alternate in the same road with the more common detrital shelves, just as in the raised beaches near the sea. In Norwegian they are called *sete*, pl. *seter*, viz. " what one sits upon."

Their horizontality requires, as in Lochaber, a water-level as an accompanying factor in their formation. But here in Norway this can certainly not have been the sea, as advocated by Darwin for the roads in Lochaber. Their height is from 657 to 1090 metres, and while the land stood only 180 metres lower than now, the central part of the country was yet covered by a *mer-de-glace* of very considerable bulk, up to 650 metres, which certainly must have destroyed such superficial formations as these detritus roads. Several other arguments may also be brought forward against their marine origin. In Lochaber the coincidence in height of the roads and the cols leading eastward has settled the question that it must have been in local dammed lakes that the shelves originated.

In Norway such a coincidence with cols is not as yet evidently demonstrated, but the elevations already known make it quite probable. The main rivers in the examined tract are the Glommen (the greatest river in Norway) and its affluent, the Folla. The cols at their sources are 664 metres and 950 metres high, and with these heights agree very nearly eight *seter* and three great terraces at different places in Glomdalen, and two *seter* and one terrace in Foldal. This result and some others in accordance with it were mainly obtained by measurements with the aneroid during a single week last summer, and I cannot therefore but take it for granted that a closer examination will find corresponding cols to all *seter*.

The great question here, as in Lochaber, is, What has dammed up these great lakes, which attain a length of 280 kilometres and a depth of more than 300 metres? The difficulties which beset any theory supposing detrital obstacles are still more insurmountable here than in Scotland. About 1000 feet to be removed without traces for every great valley! At the highest *sete* (1090 metres) in the Rondane Mountains it is necessary to build up detritus dams almost all round, as the present environs will not contribute much. Against Agassiz's glacier theory in the form adopted by Jamieson there is advanced the very vigorous objection that a glacier from any neighbouring valley would certainly not be forced up against the opposite side of the valley to the required height when its way up and down the glen was free; besides which the ends of glaciers are generally very much creviced, and there must have been glaciers in all the valleys if in any. To this powerful argument from Milne Home and others there may be added for the Norwegian *seter* that any purely local obstruction in several parallel valleys at about 61° 40′ N.—the southern boundary of the *sete* region—is not very probable.

Where, then, is the required dam to be found? Both in Lochaber and in the *sete* region of Central Norway we meet with the same remarkable glacial phenomenon: the striæ go *upwards* against the drainage. The boulder transport makes this an indisputable fact for a great part of Glomdalen. From this it is a certain deduction that the glacier-shed has not followed the watershed. In Scotland the glacier-marks go higher in the western part than to the east of Lochaber, and as the precipitation is also greater here the originally higher part of the *mer-de-glace* to the west must certainly have persisted for the longest time. By the great ablation the outer margin of the nap shrank from the east coast, gradually retreating up the Great Glen and Strath Spey, &c., towards the corner between the highest mountains in Scotland, where the last rest must have lingered rather long. *This last rest of the inland ice was*, I presume, *that which formed the block*, gradually damming up lakes as it sank below or shrank behind the cols. That it was solid enough as it lay there as a mighty bulk without crevices, which are only caused by movement, can hardly be doubted. The dying rest perhaps sent also relatively slowly-moving glaciers almost to the last straight up the glens in the same direction as the striæ till.

In Norway the last rest of the great inland ice may be supposed to have persisted where the greatest thickness had been, viz. below the glacier-shed. This can be found by the assistance of the southern limit of the north-going striæ, which, as might be expected, coincides very well with the known southern limit of the *seter*, with the exception of a few observations of striæ which a later examination may prove erroneous as to the direction. This line is in Gudbrandsdalen, Österdalen, &c., 200 to 300 km. south of the watershed, and is at a still greater distance in Jemtland, in Sweden. This somewhat surprising result agrees perfectly on closer examination with the orographical and climatological probability, and may also be directly deduced from the glacial physics, but this I cannot here demonstrate to its full extent.

Between this last ice-rest and the watershed now lies this peculiar row of grand glacier lakes, which may be traced up to Swedish Lapland, though as yet no *seter* are known farther north than Jemtland. Everywhere this tract is distinguished from other highland valleys by its astonishing *terraces*. In these, now and then, is found a finely-laminated clay, which elsewhere is confined to the niveau below 500 feet, the old sea-level. This is the case not only in Osterdalen and Jemtland, but in Swedish Lapland up to 1400 feet, to the great perplexity of the older geologists of Sweden (such as Erdmann), who, convinced that this clay could only be formed in the sea, were forced to suppose a former, else improbable, sinking of the land to this extent. Its deposition in our great glacial lakes is quite natural.

The conclusions these *seter*—beaches of great height—lead to as

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to the origin of the *strandlinjer* near the sea, I shall not follow out here. I shall only remark, with respect to the parallel roads of Lochaber, that Prestwich's hypothesis of landslips is untenable as soon as the alternation of rock-shelves and detritus-shelves is recognised. A different origin for the Scottish roads and for our *seter* can hardly be supposed.

ANDR. M. HANSEN

University Library, Christiania, December 17, 1885

The New Star near χ' Orionis

THIS star, since December 20, 1885, has been very slowly decreasing in brightness. No trace of nebulosity was observed around it. Its colour on December 19 was red-orange, now it is yellow-orange. Its spectrum is of the 3rd order of Secchi. On December 19 it was very brilliant from the red to the blue, with six to eight brilliant bands decreasing in light to the violet, or the more refrangible side. Now the red of the spectrum is very dark, the yellow less luminous, and the blue more faint than before. The maximum of light is always in the green.

The apparent position of the new star, which I determined on December 20, 1885, 10h. 0m. 17s., Palermo M.T., was

$$\alpha = 5\text{h. } 49\text{m. } 4{\cdot}54\text{s.}, \ \delta = 20^\circ\ 9'\ 4''{\cdot}3.$$

Palermo Observatory, January 5

A. RICCÒ

Anchor Frosts

MR. J. HANDS, in NATURE of January 14 (p. 246), gives an interesting account of an anchor frost, "the most marked effects of which are," he says, "seen in *comparatively* still water." He adds, "it is said, that water coming upon it (anchor frost) from above will rise in level and flow over it, as over a solid obstruction. This I have not seen myself."

I have seen (and *felt*) this occur on at least one occasion, rather to my discomfort.

When in the Arctic, early one morning in late autumn, I went out to shoot deer for our winter stock of food, and forded a stream at a shallow rapid, dry-shod, in Eskimo boots coming up to the knee. The day, for the season, became very cold, and on my return homewards in the evening I found that the water in the rapid had risen so much that it came fully a foot above the tops of my boots, filling them with water. This increase of depth was wholly caused by the obstruction of a collection of ice-crystals in the form of wet snow, or pulp (through which my feet readily sank), adhering to the stony bottom of the stream. I had to hurry over the mile or two to my fireless tent, rip off my frozen boots and trousers, then jump into my blankets.

The position of this anchor-ice was the very opposite to that described by Mr. Hands, being in a swift but shallow rapid flowing out of a comparatively still deep pool frozen over with a thin coat of ice, but, where open, close above the rapid, having many small ice-crystals floating on and near the surface. The cause of these crystals coming into contact with, and adhering to, the stones at the bottom of the rapid I have given elsewhere, possibly in a previous number of NATURE.

The tenacity of cohesion of this soft mass of wet snow is more clearly indicated by its resisting the great force of a strong rapid, than where it occurs in comparatively still water.

JOHN RAE

4, Addison Gardens, Kensington, W., January 16

The Dover Boring

AS the deep boring at Dover is alluded to in the last number of NATURE (p. 255), it may be well to state that a short notice thereof was appended to my paper on the Chatham borings, which was read in abstract at the meeting of the British Association last year, and that a fuller account was included in my paper "On Deep Borings in Kent," read to the Geological Society a few weeks ago (December 2, 1885), and noticed in NATURE of Dec. 24, p. 190. Since then I have got some further information, and specimens of the deeper beds found are now under examination by Mr. J. Sharman, Palæontologist to the Geological Survey. My paper being now in type, though not yet published, there is no need to enter into details, either of this or of a still deeper boring now going on in the same county. Any additional evidence as to the deep-seated rocks of Kent I hope to give in a supplementary paper, if needful, and I hope also shortly to visit the sites of the two borings referred to.

WILLIAM WHITAKER

33, East Park Terrace, Southampton

The Viper and its Young

I WAS very much interested in an account of a viper swallowing its young, given in NATURE a short time ago, and would like to corroborate the statement of Mr. Middleton's correspondent, anent this extraordinary performance, by relating as briefly as possible a little incident of which I was a witness. About the end of August 1885, I was watching a coolie underbushing in the bush on the Demerara River, Demerara, when suddenly a large labaria snake raised his head with open mouth just in front of the coolie. The man struck at it with his cutlass (a knife about twenty inches long), and afterwards assured me that he hit the snake, but I saw the reptile glide off towards the river. I pursued, but without success, the snake having doubtless taken advantage of the river as a means of escape. The coolie, who was a thorough bushman, having been born and brought up in the bush, told me that in all probability there would be another labaria not far off, as they always went in pairs. Next afternoon I heard that William, the coolie, had encountered another labaria, which he had killed. On my going to the place where he was at work, he told me he had buried the snake after cutting off the head. I may here state that a bushman almost invariably buries a snake after killing it, interring the head in a separate grave from the body. This the bushman does because, he says, if any one puts his foot on a snake's skeleton and a bone pierces the skin, the result will be nearly akin to the bite of the snake. This common belief among the sons of the forest has no doubt a good deal of truth in it, especially if a bone be broken in the wound. The interment of the head in a separate grave is merely done as a graphic assurance that the snake can never come to life again. Being curious to know if this labaria was the one I had seen on the previous day, I made William dig the reptile up, and was pleased to find it altogether a much thicker and shorter snake. On recounting his narrow escape from a bite, William vented his spleen by giving the snake's body a hack with his cutlass, when, to my astonishment, out through the wound came seven young ones, varying from five to ten inches in length, as nearly as I could guess. They were all quite lively, although covered with a sort of thin film or saliva. The largest of the brood seemed quite determined on business straight off, so I rapped him over the neck with the back of my knife. We killed the whole lot of them, and William carefully buried them, remarking that the bite of the young was quite as bad as the bite of the old snake. Now these snakes had been buried at a depth of eight or ten inches for from sixteen to eighteen hours, and on liberation did not seem a whit the worse for their entombment. William told me that when he saw the snake first it was lying coiled up fast asleep, and that he had nearly put his foot right on top of it; he, however, cut a stick and killed it before it awoke. We both agreed that from the appearance of the snake she had shed her skin only a few days before. This in all probability was the case, as I found a shed skin about three yards from where she had been killed. The little snakes seemed to me to be inside the stomach, and not in the gullet as Mr. Middleton suggests. The mother also was in a place where there was scarcely any likelihood of her ever having been disturbed to cause her to swallow her brood, and it will be evident that the young did not quickly perish even after the mother was dead. From what has just been stated, would it not be reasonable to advance the theory that the mother snake swallows the young ones after they are hatched, and retains them in her stomach until they attain a development that fits them to take care of themselves, when she either vomits them up, or they wriggle out of her mouth of their own free will?

Not being a naturalist, I am sorry that I cannot give any but the Indian name of this snake, but I will endeavour to find it out if you wish. The labaria must be well enough known to naturalists.

A CREOLE

White Blackbirds

A WHITE blackbird lived in our garden a year or so ago for about twelve months. Our gardener had seen it there, or at least one like it, before. I often saw it within a few yards' distance, and it was certainly three parts white, though presenting a mottled appearance. Some neighbours who heard us speak of it said it must be *their* white blackbird, meaning that they had seen it in their gardens. It was shy, but not more so than other blackbirds, and once, during sharp winter weather,

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